

Conference Abstract

# Intelligent Technology for the Monitoring and Protection of Insect Biodiversity

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## Abstract

Monitoring and identification are vitally important to insect biodiversity conservation and protection. As a popular and comparatively well known order, Lepidoptera (moths and butterflies) are good indicators of insect biodiversity. Through much research and testing, a reliable image recognition method and online software were developed. The method includes a color histogram and dual tree complex wavelet transform (DTCWT), local mean color feature based method, sparse coding and scale conjugate gradient (SCG) back propagation neural network (BPNN), and Opponent SIFT (scale invariant feature transform). The result showed that Opponent SIFT was the best choice, reaching 100.00% recognition accuracy, while the first three were 91.98%, 91.96% and 99.43%, respectively. Thus an online consulting system was established, based on Opponent SIFT. After the users load the unknown image of the lepidopteran, the system can output the recognition result and all information about the species. New, but otherwise known species can be added to continuously expand the system.

A simple and viable scheme to identify insect sounds automatically was also introduced, using a sound parameterization technique that dominates speaker recognition technology. The acoustic signal is preprocessed and segmented into a series of sound samples. MFCC (Mel-frequency cepstrum coefficient) is extracted from the sound sample, and a feature model is trained using Linde-Buzo-Gray algorithm (Linde et al. 1980) to generate vector

quantization (VQ) codebook from the above MFCC. The matching for a test sample is completed by finding the nearest neighbour in all the VQ codebooks. The method is tested in a database with acoustic samples of 70 different insect sounds (data from [insect sound library](#), Mankin et al. 2008). The recognition rate was above 96%, and an ideal time performance was also achieved with the recognition time of 9.13s. Sound recognition software system will also be installed.

## Keywords

insect, biodiversity, image recognition, sound recognition

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